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GIFFORD, KRASS, SPRINKLE,ANDERSON & CITKOWSKI, P.C
PO BOX 7021
TROY, MI 48007-7021

EXAMINER	
TRAN, THIEN S	

ART UNIT	PAPER NUMBER
3742	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/525,938	BAGAVATH-SINGH, VIJAYAVEL	
	Examiner	Art Unit	
	THIEN TRAN	3742	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *24 March 2010*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-13* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-13* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *6/1/2010*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2. The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

3. Claims 1-4, 8 and 9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Suh (US Patent Pub 2004/0251242) in view of Ito (US Patent 5,715,375).

4. Regarding claim 1, Suh teaches forming a metal section on a metal substrate (Fig 2 & 5, Item 201, Pg 1, 0009, Lines 4-6) by depositing a plurality of superimposed layers (Fig 2 & 5, Item 205, Pg 1, 0009, Lines 1-2) using a laser (Fig 5, Item 501, Pg 4, 0056, Lines 6-7) laser beam generating a heating beam and a powdered metal source (Fig 4, Item 404, Pg 3, 0046) operative to feed metal powder into the beam and moving the substrate relative to the beam under numerical control over a programmed path (Fig 4, Item 403, Pg 4, 0053) to provide an advancing melt pool (Fig 5, Item 203, Pg 4, 0055) comprising: sensing parameters of the melt pool (Fig 5, Item 407, Pg 4,

0055 & 0056, variations in height) at a plurality of selected coordinates (Pg 5, 0072, pixels) during the generation of a plurality of metallic layers, and processing (Fig 4, Item 403, Pg 4, 0054) the stored parameters to determine an appropriate laser power for use during the deposition of a subsequent layer (Abstract, Lines 5-15). Suh does not teach storing the sensed parameters.

5. In analogous art of robot control system for executing multi-layer welding, Ito discloses storing the sensed parameters (Fig 4, Item 16, Col 5, Lines 21-24) for the benefit of processing the image information by the image processor (Col 5, Lines 24-26). It would have been obvious to one having ordinary skill in the art at the time of the invention to combine the teachings of Suh with the memory storage of Ito for the benefit of processing the image information by the image processor. Examiner interprets that the pixels of Suh are equivalent to the applicant's plurality of selected coordinates because pixels of Suh represent the plurality of coordinates that make up the height of the weld pool.

6. Regarding claim 2, Suh teaches determining the appropriate laser power for use during the deposition of the next layer (Abstract, Lines 5-15). Suh does not teach comparing a matrix of the sensed parameters stored during formation of the last layer deposited with the matrix of the sensed parameters of an earlier deposited layer. In analogous art of robot control system for executing multi-layer welding, Ito discloses comparing (Col 2, Lines 33-35) a matrix of the sensed parameters stored (Fig 4, Item 16, Col 5, Lines 21-24) during formation of the last layer (Fig 8, Col 7, Lines 41-54, height of third layer) deposited with the matrix of the sensed parameters of an earlier

deposited layer (Fig 8, Col 7, Lines 16-27, height of second layer) for the benefit of providing a control system for executing multi-layer welding (Col 2, Lines 11-12). It would have been obvious to one having ordinary skill in the art at the time of the invention to combine the teachings of Suh with the comparison of Ito for the benefit of providing a control system for executing multi-layer welding.

7. Regarding claim 3, Suh does not teach where the earlier deposited layer constitutes the second layer deposited over the substrate. In analogous art of robot control system for executing multi-layer welding, Ito discloses where the earlier deposited layer constitutes the second layer (Col 4, Lines 26-30, second layer) deposited over the substrate for the benefit of gradually increasing the height of the resulting weld layer (Col 4, Lines 28-30). It would have been obvious to one having ordinary skill in the art at the time of the invention to combine the teachings of Suh with the second layer of Ito for the benefit of gradually increasing the height of the resulting weld layer.

8. Regarding claim 4, Suh teaches where the sensed parameters of the pool comprise dimensions of the pool (Fig 7, Item 203, Pg 5, 0072 & 0073, height of the molten pool).

9. Regarding claim 8, Suh teaches forming a metal section on a metal substrate (Fig 2 & 5, Item 201, Pg 1, 0009, Lines 4-6) by depositing a plurality of superimposed layers (Fig 2 & 5, Item 205, Pg 1, 0009, Lines 1-2) by using a power source generating a heating beam (Fig 5, Item 501, Pg 4, 0056, Lines 6-7) and a metal source (Fig 4, Item 404, Pg 3, 0046) operative to feed metal powder into the beam and moving the

substrate (Fig 4, Item 402, Pg 4, 0050) relative to the beam to provide an advancing melt pool (Fig 5, Item 203, Pg 4, 0055) comprising: sensing parameters of the melt pool (Fig 5, Item 407, Pg 4, 0055 & 0056, variations in height) at a plurality of selected coordinates (Pg 5, 0072, pixels) during the generation of a plurality of metallic layers, and processing (Fig 4, Item 403, Pg 4, 0054) the stored parameters to determine an appropriate laser power for use during the deposition of a subsequent layer (Abstract, Lines 5-15). Suh does not teach storing the sensed parameters. In analogous art of robot control system for executing multi-layer welding, Ito discloses storing the sensed parameters (Fig 4, Item 16, Col 5, Lines 21-24) for the benefit of processing the image information by the image processor (Col 5, Lines 24-26). It would have been obvious to one having ordinary skill in the art at the time of the invention to combine the teachings of Suh with the memory storage of Ito for the benefit of processing the image information by the image processor. Examiner interprets that the pixels of Suh are equivalent to the applicant's plurality of selected coordinates because pixels of Suh represent the plurality of coordinates that make up the height of the weld pool.

10. Regarding claim 9, Suh teaches where the power source is a laser (Fig 5, Item 501, Pg 4, 0056, Lines 6-7).

11. Claims 5-7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Suh (US Patent Pub 2004/0251242) in view of Ito (US Patent 5,715,375) as applied to claims 1-4, 8 and 9 above, further in view of Chang (US Patent 5,681,490). The combined Suh-Ito teaching discloses substantially all features of the claimed invention as set forth above.

12. Regarding claim 5, Suh in view of Ito does not teach where the sensed parameters of the pool comprise the optical intensity of the weld pool. In analogous art of laser weld quality monitoring system, Chang discloses where the sensed parameters comprise the optical intensity (Fig 2, Item 22, Col 2, Lines 45-46) of the weld pool (Fig 2, Item 21, Col 2, Lines 43-45) for the benefit of determining the progressive stages of the laser process and the expected weld quality (Abstract, Lines 13-15). It would have been obvious to one of ordinary skill in the art at the time of the invention to combine the teachings of Suh and Ito with the sensor of Chang for the benefit of determining the progressive stages of the laser process and the expected weld quality.

13. Regarding claim 6, Suh in view of Ito teaches where the sensed parameters of the pool comprise the dimensions of the pool (Suh, Fig 7, Item 203, Pg 5, 0072 & 0073, height of the molten pool). Suh in view of Ito does not teach where the sensed parameters of the pool comprise the optical intensity of the pool. In analogous art of laser weld quality monitoring system, Chang discloses where the sensed parameters comprise the optical intensity (Fig 2, Item 22, Col 2, Lines 45-46) of the weld pool (Fig 2, Item 21, Col 2, Lines 43-45) for the benefit of determining the progressive stages of the laser process and the expected weld quality (Abstract, Lines 13-15). It would have been obvious to one of ordinary skill in the art at the time of the invention to combine the teachings of Suh and Ito with the optical sensor of Chang for the benefit of determining the progressive stages of the laser process and the expected weld quality.

14. Regarding claim 7, Suh in view of Ito does not teach where the sensed parameters of the melt pool comprise the temperature of the melt pool. In analogous art of laser weld quality monitoring system, Chang discloses where the sensed parameters comprise the temperature (Fig 2, Item 24, Col 2, Lines 47-50 & Abstract, Lines 2-5, temperature) of the melt pool (Fig 2, Item 21, Col 2, Lines 43-45) for the benefit of determining the progressive stages of the laser process and the expected weld quality (Abstract, Lines 13-15). It would have been obvious to one of ordinary skill in the art at the time of the invention to combine the teachings of Suh and Ito with the sensor of Chang for the benefit of determining the progressive stages of the laser process and the expected weld quality.

15. Claim 10 is rejected under 35 U.S.C. 103(a) as being unpatentable over Suh (US Patent Pub 2004/0251242) in view of Ito (US Patent 5,715,375) as applied to claim 8, further in view of Ekerot (US Patent 3,991,930).

16. Regarding claim 10, Suh in view of Ito does not teach where the power source is an electron beam. In analogous art of method of producing a multi-layer metal strip, Ekerot discloses where the power source is an electron beam (Col 1, Lines 10-11) for the benefit of welding a multi-layer metal strip (Col 1, Lines 5-11). It would have been obvious to one having ordinary skill in the art at the time of the invention to combine the teachings of Suh and Ito with the electron beam of Ekerot for the benefit of welding a multi-layer metal strip.

17. Claims 11-13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Suh (US Patent Pub 2004/0251242) in view of Ito (US Patent 5,715,375) as applied to claims 8 and 12, further in view of Benda (US Patent 5,427,733).

18. Regarding claim 11, Suh in view of Ito does not teach where the power beam level is maintained at a constant during the generation of each layer. In analogous art of method of performing temperature-controlled laser sintering, Benda discloses as being known in the art where the power beam level is maintained at a constant during the generation of each layer (Col 1, Lines 47-51, laser beam at a substantially constant power) for the benefit of causing the particles of powder to fuse together in the heating region (Col 1, Lines 38-40). It would have been obvious to one having ordinary skill in the art at the time of the invention to combine the teachings of Suh and Ito with the constant power disclosed by Benda for the benefit of causing the particles of powder to fuse together in the heating region.

19. Regarding claim 12, Suh teaches forming a metal section on a metal substrate (Fig 2 & 5, Item 201, Pg 1, 0009, Lines 4-6) by depositing a plurality of superimposed layers (Fig 2 & 5, Item 205, Pg 1, 0009, Lines 1-2) using a heating beam (Fig 5, Item 501, Pg 4, 0056, Lines 6-7) and a powdered metal source (Fig 4, Item 404, Pg 3, 0046) operative to feed metal powder into the beam and moving the substrate relative to the beam under numerical control over a programmed path (Fig 4, Item 403, Pg 4, 0053) to provide an advancing melting pool (Fig 5, Item 203, Pg 4, 0055) comprising: depositing a first layer (Fig 2 & 5, Item 205, Pg 1, 0009, Lines 1-2) in contact with the substrate (Fig 5, Item 201, Pg 1, 0009, Lines 4-6) using a first heating beam power

(Fig 5, Item 501, Pg 4, 0056, Lines 6-7); depositing a second layer (Fig 2 & 5, Item 205, Pg 1, 0009, Lines 1-2) over the first layer sensing parameters of the melt pool (Fig 5, Item 407, Pg 4, 0055 & 0056, variations in height) at a plurality of selected coordinates (Pg 5, 0072, pixels) during the generation of said second layer; depositing a third layer (Fig 2 & 5, Item 205, Pg 1, 0009, Lines 1-2) and sensing parameters of the melt pool (Fig 5, Item 407, Pg 4, 0055 & 0056, variations in height) at said selected coordinates (Pg 5, 0072, pixels) during generation of the third layer; and using (Fig 4, Item 403, Pg 4, 0054) the stored parameters of the melt pool during generation of the second and third layers to determine an appropriate heating beam power for use during deposition of subsequent layers (Abstract, Lines 5-15).

20. Suh does not teach storing the sensed parameters and using the same heating beam power for the first, second and third layers. In analogous art of robot control system for executing multi-layer welding, Ito discloses storing the sensed parameters (Fig 4, Item 16, Col 5, Lines 21-24) for the benefit of processing the image information by the image processor (Col 5, Lines 24-26). It would have been obvious to one having ordinary skill in the art at the time of the invention to combine the teachings of Suh with the memory storage of Ito for the benefit of processing the image information by the image processor.

21. Suh in view of Ito further does not teach using the same heating beam power for the first, second and third layers. In analogous art of method of performing temperature-controlled laser sintering, Benda discloses as being known in the art using the same heating beam power (Col 1, Lines 47-51, laser beam at a substantially

constant power) for the first, second and third layers for the benefit of causing the particles of powder to fuse together in the heating region (Col 1, Lines 38-40). It would have been obvious to one having ordinary skill in the art at the time of the invention to combine the teachings of Suh and Ito with the constant power disclosed by Benda for the benefit of causing the particles of powder to fuse together in the heating region.

22. Examiner interprets that the pixels of Suh are equivalent to the applicant's plurality of selected coordinates because pixels of Suh represent the plurality of coordinates that make up the height of the weld pool. Examiner further interprets that Suh teaches a second and third layer because the method of Suh is an iterative where a plurality of layers are deposited on top of each other (Abstract, Lines 13-14, laser cladding and laser-aided direct metal manufacturing).

23. Regarding claim 13, as applied to claim 12, Suh teaches where as each subsequent layer is deposited (Abstract, Lines 13-14, laser cladding and laser-aided direct metal manufacturing), the parameters of the melt pool are sensed (Fig 5, Item 407, Pg 4, 0055 & 0056, variations in height) at the plurality of selected coordinates (Pg 5, 0072, pixels) and are used to determine the heating beam power for subsequent layers (Abstract, Lines 5-15). Suh does not teach storing the sensed parameters. In analogous art of robot control system for executing multi-layer welding, Ito discloses storing the sensed parameters (Fig 4, Item 16, Col 5, Lines 21-24) for the benefit of processing the image information by the image processor (Col 5, Lines 24-26). It would have been obvious to one having ordinary skill in the art at the time of the

invention to combine the teachings of Suh with the memory storage of Ito for the benefit of processing the image information by the image processor.

Response to Arguments

24. Applicant's arguments filed on 3/24/2010 with respect to claims 1-4, 8 and 9 and the 35 USC 103(a) rejection of Suh in view of Ito have been fully considered but they are not persuasive.

25. Regarding the Remarks with respect to claims 1-4, 8 and 9 on page 2 and Suh "stores no information from previous layers for use in subsequent layers" the examiner disagrees. The method of Suh is directed to laser cladding and laser-aided direct metal manufacturing process (Abstract, Lines 1-5), which is the process of building a 3D object in 2D layers (Pg 1, 0007). It is inherent in laser cladding and laser-aided direct metal manufacturing process that information about the previous layer will be stored to be used in the subsequent layers to be able to correctly build the 3D object. The apparatus of Suh has a computer (Fig 4, Item 403, Pg 4, 0053) and the computer has memory to store the information about the previous layer to be used in the subsequent layers. But because Suh indirectly mentions these limitations of the claims, Ito was added for completeness.

26. Ito teaches where information from previous layers (Fig 5, Layers 1-3, Col 6, Lines 6-19) is stored (Fig 4, Item 16, Col 5, Lines 21-24) for use in subsequent layers (Fig 5, Layers 1-3, Col 6, Lines 6-19). Suh in view of Ito discloses the claimed limitations of claims 1-4, 8 and 9.

27. Regarding the Remarks with respect to claims 1-4, 8 and 9 on page 4 about the improper combination of Suh in view of Ito and how it is unrelated to the applicants claimed steps of "sensing the parameters of the melt pool at a plurality of selected coordinates during the generation of a plurality of metallic layers; storing the sensed parameters of the pool at each of the selected coordinates; and processing the stored parameters to determine the appropriate laser power for use during the deposition of a subsequent layer." the examiner disagrees.

28. Suh teaches sensing parameters of the melt pool (Fig 5, Item 407, Pg 4, 0055 & 0056, variations in height) at a plurality of selected coordinates (Pg 5, 0072, pixels) during the generation of a plurality of metallic layers, and processing (Fig 4, Item 403, Pg 4, 0054) the stored parameters to determine an appropriate laser power for use during the deposition of a subsequent layer (Abstract, Lines 5-15). Suh discloses the claimed invention except for storing the sensed parameters.

29. In analogous art of robot control system for executing multi-layer welding, Ito discloses storing the sensed parameters (Fig 4, Item 16, Col 5, Lines 21-24) for the benefit of processing the image information by the image processor (Col 5, Lines 24-26). It would have been obvious to one having ordinary skill in the art at the time of the invention to combine the teachings of Suh with the memory storage of Ito for the benefit of processing the image information by the image processor.

30. Combining the storing of the senses parameters of Ito would allow the image processer (Fig 4A, Item 408, Pg 4, 0054) of Suh to allow the controller (Fig 4A, Item 408, Pg 4, 0054) to store the sensed parameters (Fig 5, Item 407, Pg 4, 0055 & 0056,

variations in height) to determine an appropriate laser power for use during the deposition of a subsequent layer (Abstract, Lines 5-15).

31. The combinations of Suh and Ito are further appropriate because they are in the same field of endeavor and are justified by the following case law.

> When a work is available in one field of endeavor, design incentives and other market forces can prompt variations of it, either in the same field or a different one. If a person of ordinary skill can implement a predictable variation, § 103 likely bars its patentability. For the same reason, if a technique has been used to improve one device, and a person of ordinary skill in the art would recognize that it would improve similar devices in the same way, using the technique is obvious unless its actual application is beyond his or her skill. See MPEP § 2141.

The U.S. Supreme Court supplied seven rationales in *KSR International* **v.** *Teleflex Inc.* (550 USPQ2d 1385) that, by following the factual inquiries set forth in *Graham* **v.** *John Deere Co.* (383 U.S. 1, 148 USPQ 459 (1966)), establish a prima facie case of obviousness. The rationales are:

> (a) Combining prior art elements according to known methods to yield predictable results;
> (b) Simple substitution of one known element for another to obtain predictable results;
> (c) Use of a known technique to improve similar devices, methods, or products in the same way;
> (d) Applying a known technique to a known device, method, or product ready for improvement to yield predictable results;
> (e) "Obvious to try" - choosing from a finite number of identified, predictable solutions, with a reasonable expectation of success;
> (f) Known work in one field of endeavor may prompt variations of it for us in either the same field or a different one based on design incentives or other market forces if the variations are predictable to one of ordinary skill in the art;
> (g) Some teaching, suggestion, or motivation to combine prior art references that would have led one of ordinary skill to modify the prior reference teachings to arrive at the claimed invention.

The Examiner notes that above rationales are merely exemplary. For more information, see MPEP § 2141.

Conclusion

32. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to THIEN TRAN whose telephone number is (571)270-7745. The examiner can normally be reached on Mon-Thurs, 8-5PM EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Tu Hoang can be reached on 571-272-4780. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/THIEN TRAN/
Examiner, Art Unit 3742
6/8/2010
/TU B HOANG/

Supervisory Patent Examiner, Art Unit 3742